

[Revised Pages] OCTOBER 17, 2003CLAIMS

1. A device for correcting a flexible material web (1) that is guided to a processing machine, wherein the underside of the material web incorrectly points upward due to wrongly connected web ends or due to twisting,  
with a rotatable pair of cylinders (2) that is arranged on a rotating device (3) fixed on a frame (4) and causes the material web (1) to be turned by 180° about its longitudinal axis such that the underside of the material web once again correctly point downward, and  
with stationary pairs of cylinders (7, 8) that are respectively arranged upstream and downstream of the rotatable pair of cylinders (2), particularly in the region of the respective face sides of the frame (4), wherein the rotatable pair of cylinders (2) can be displaced along the frame (4), and wherein the cylinders of the first and/or the second stationary pair of cylinders (7, 8) and of the rotatable pair of cylinders (2) can be moved into an open position and a closed position.
2. The device according to Claim 1, characterized in that the frame (4) is fixed on a stand (5) that ensures a distance of approximately 1000 mm between the frame (4) and the removal station (6) of the material web (1).
3. The device according to Claim 1 or 2, characterized in that the cylinders of the rotatable pair of cylinders (2) are situated in the closed position in the normal operating mode (flawless material web or correctly positioned supply, respectively).

4. The device according to one of Claims 1-3, characterized in that the rotatable pair of cylinders (2) is positioned approximately in the center between the two stationary pairs of cylinders (7, 8).
5. The device according to one of Claims 1-4, characterized in that the cylinders of both stationary pairs of cylinders (7, 8) are situated in the closed position in the normal operating mode (flawless material web or correctly positioned supply, respectively).
6. The device according to one of Claims 1-5, characterized in that at least one detection device (11, 12) for detecting a flawed material web and/or the incorrectly positioned supply thereof is arranged upstream of the rotatable pair of cylinders (2).
7. The device according to Claim 6, characterized in that a first detection device (11) is arranged upstream of the first stationary pair of cylinders (2), and in that a second detection device (12) is arranged between the first stationary pair of cylinders (7) and the rotatable pair of cylinders (2).
8. The device according to Claim 6 or 7, characterized in that the detection device (11, 12) causes the rotatable pair of cylinders (2) to turn in order to correct the flaw after the detection of a flawed material web (1) and/or the incorrectly positioned supply of the material web (1), particularly by transmitting corresponding signals.
9. The device according to one of Claims 6-8, characterized in that the material web (1) contains a twist.

10. The device according to Claim 9, characterized in that the detection device (11, 12) causes the cylinders of the rotatable pair of cylinders (2) to open after the detection of a twist in the material web (1), in that the rotatable pair of cylinders (2) passes over the twist in the material web (1) in the direction of the first stationary pair of cylinders (7), and in that the cylinders of the rotatable pair of cylinders are moved into the closed position when it is spaced apart from the first stationary pair of cylinders (7) by a short distance of, in particular, approximately 100 mm such that the twist is situated between the rotatable pair of cylinders (2) and the second stationary pair of cylinders (8).
11. The device according to Claim 10, characterized in that the cylinders of the first stationary pair of cylinders (7) are moved into the open position as soon as the rotatable pair of cylinders (2) has assumed its closed position a short distance therefrom, and in that the rotatable pair of cylinders (2) is turned by 180° in order to correct the twist in the material web (1) between the rotatable pair of cylinders (2) and the second stationary pair of cylinders (8).
12. The device according to Claim 11, characterized in that the new twist in the material web (1) being created between the first stationary pair of cylinders (7), the cylinders of which are still open, and the rotatable pair of cylinders (2) due to the turning of the rotatable pair of cylinders (2) passes through the first rotatable pair of cylinders (7) in the direction of the removal station (6), wherein the cylinders of the first stationary pair of cylinders are immediately moved back into the closed position such that a flawless progression of the material web is achieved

between all pairs of cylinders (2, 7, 8) and the rotatable pair of cylinders (2) can be moved back into its normal position.

13. The device according to one of Claims 10-12, characterized in that the material web (1) contains two web ends that are wrongly connected to one another, in particular, such that the underside of one material web is connected to the upper side of the other material web.
14. The device according to Claim 13, characterized in that a cutting and connecting device (16) as well as a material web reservoir (17) are arranged downstream of the rotatable pair of cylinders (2).
15. The device according to Claim 14, characterized in that the cutting and connecting device (16) is arranged between the second stationary pair of cylinders (8) and the rotatable pair of cylinders (2).
16. The device according to Claim 14 or 15, characterized in that the material web reservoir (17) is arranged between the second stationary pair of cylinders (8) and the processing machine (V).
17. The device according to one of Claims 14-16, characterized in that the detection device (11, 12) causes the material web (1) to be stopped for approximately 1-3 seconds after the detection of the wrong connection between the web ends of the material web (1), wherein the processing machine (V) is supplied from the material web reservoir (17) during this time and the material web (1) is severed in the cutting and connecting device (16), preferably in the region of the wrong connection or upstream thereof.

18. The device according to Claim 17, characterized in that the web ends are respectively held in the rotatable pair of cylinders (2) and in the cutting and connecting device (16).
19. The device according to Claim 18, characterized in that the rotatable pair of cylinders is turned by 180°, wherein a twist is created in the section (V2) between the first stationary pair of cylinders (7) and the rotatable pair of cylinders (2), and wherein the upper side of the material web (1) now correctly points upward in the section (N2).
20. The device according to Claim 18, characterized in that the material web ends are connected in the cutting and connecting device (16) and the material web (1) is additionally transported to the processing machine (V) or to the material reservoir (17), respectively.
21. The device according to Claim 20, characterized in that the twist situated in the section (V2) between the first stationary pair of cylinders (7) and the rotatable pair of cylinders (2) is corrected by moving the cylinders of the first stationary pair of cylinders (7) into the open position in order to enable the twist to pass through the cylinders of the first stationary pair of cylinders.
22. The device according to one of Claims 6-21, characterized in that the detection devices (11, 12) consist of CCD cameras and/or detection devices based on laser technology and/or capacitive measuring devices and/or inductive measuring devices.
23. The device according to one of Claims 1-22, characterized in that the rotatable pair of cylinders

(2) and/or the rotating device (3) form/forms part of a slide (9) that can be displaced on the frame (4).

24. The device according to one of Claims 1-23, characterized in that servomotors (10, 15), particularly a.c. motors, are provided for driving the rotating device (3), the slide (9) and the cylinders of the pairs of cylinders (2, 7, 8) that can be moved into the open and the closed position.
25. The device according to Claim 24, characterized in that the detection device (11, 12) transmits signals and commands for controlling the motion sequences to the servomotors (10, 15) via SPS or PC.
26. A method for correcting a flexible material web (1) that is guided to a processing machine, wherein the underside of the material web incorrectly points upward due to wrongly connected web ends or due to twisting, wherein the material web is turned at least once about its longitudinal axis in such a way that the underside of the material web once again correctly points downward and the correct upper side of the material web is transported to the processing machine, characterized in that the material web (1) is turned by 180° by means of a rotatable pair of cylinders (2) in a section (V2, N2) between at least one stationary pair of cylinders 7, 8 and the rotatable pair of cylinders (2) such that the flaw is corrected.
27. The method according to Claim 26, characterized in that the flaw in the material web (1) is detected and commands are transmitted to the pairs of cylinders (2, 7, 8) in dependence on the detected flaw.
28. The method according to Claim 27, wherein the material web contains an undesirable twist, characterized in

that the cylinders of the rotatable pair of cylinders (2) are opened after the detection of the twist in the material web (1).

29. The method according to Claim 28, characterized in that the rotatable pair of cylinders (2) passes over the twist in the material web (1) in the direction of the first stationary pair of cylinders (7), and in that its cylinders are moved into the closed position a short distance from the first stationary pair of cylinders (7) such that the twist is situated between the rotatable pair of cylinders (2) and the second stationary pair of cylinders (8).
30. The method according to Claim 29, characterized in that the cylinders of the first stationary pair of cylinders (7) are moved into the open position after the cylinders of the rotatable pair of cylinders (2) arranged adjacent to the first stationary pair of cylinders (7) reach the closed position, and in that the rotatable pair of cylinders (2) is subsequently turned in order to correct the twist in the material web (1) between the rotatable pair of cylinders (2) and the second stationary pair of cylinders (8).
31. The method according to Claim 30, characterized in that a new twist is created between the first stationary pair of cylinders (7), the cylinders of which are still open, and the rotatable pair of cylinders (2) after the rotatable pair of cylinders (2) is turned, wherein the new twist is corrected by the new twist in the material web (1) passing through the cylinders of the first stationary pair of cylinders (7) in the direction of the removal station (6) and by moving the cylinders of the first stationary pair of cylinders (7) back into the closed position immediately thereafter such that a flawless

progression of the material web is achieved between all pairs of cylinders (2, 7, 8) and the rotatable pair of cylinders (2) can be moved back into its normal position in the direction of the second stationary pair of cylinders (8).

32. The method according to Claim 27, wherein the material web contains two web ends that were wrongly connected, particularly such that the underside of one material web is connected to the upper side of the other material web, characterized in that the material web (1) is stopped for 1-3 seconds after the detection of the wrong connection between the web ends,  
in that the material web (1) is severed,  
in that the rotatable pair of cylinders (2) is turned by 180° together with the twisted material web (1),  
in that the web ends are correctly connected to one another,  
in that the processing machine (V) is supplied with the material web (1) from a material web reservoir (17) during these processes, and  
in that the material web (1) is additionally transported to the processing machine (V) or to the material web reservoir (17), respectively, after the connection between the web ends is produced.
33. The method according to Claim 32, characterized in that the turning of the rotatable pair of cylinders (2) causes a twist to be created in the section (V2) between the first stationary pair of cylinders (7) and the rotatable pair of cylinders (2), wherein said twist is corrected by opening the cylinders of the rotatable pair of cylinders (2) and the rotatable pair of cylinders passing over the twist in the direction of the pair of cylinders (7), and wherein the cylinders of the rotatable pair of cylinders are moved



into the closed position a short distance from the first stationary pair of cylinders (7) such that the twist is now situated in the section (N2).

34. The method according to Claim 33, characterized in that the cylinders of the first stationary pair of cylinders (7) are moved into the open position after the cylinders of the rotatable pair of cylinders (2) arranged adjacent to the first stationary pair of cylinders (7) reach the closed position, and in that the rotatable pair of cylinders (2) is subsequently turned by 180° in order to correct the twist in the material web (1) in the section (N2) such that the respective sides of the material web correctly point upward and downward.
35. The method according to Claim 34, characterized in that a new twist is created in the section (V2) after the rotatable pair of cylinders (2) is turned, wherein the new twist is corrected by opening the cylinders of the first stationary pair of cylinders (7) such that the new twist in the material web (1) is able to pass through the cylinders of the first stationary pair of cylinders (7) in the direction of the removal station (6) and by moving the cylinders of the first stationary pair of cylinders (7) back into the closed position immediately thereafter such that a flawless progression of the material web is achieved between all pairs of cylinders (2, 7, 8) and the rotatable pair of cylinders (2) can be moved back into its normal position in the direction of the second stationary pair of cylinders (8).